

Original Communication

Mechanism and strategies for preventing post-traumatic stress disorder in forensic workers responding to mass fatality incidents

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Abstract

Mass fatality incidents (MFIs) expose medical examiners/coroners and associated staff to circumstances that may increase their risk for developing post-traumatic stress disorder (PTSD). The aim of this paper is to provide guidance for efforts to prevent the development of PTSD in forensic teams who respond to mass disasters. We present a model of the paths through which exposure to mass fatality incidents may lead to PTSD symptoms in forensic and recovery workers. The model is based on current research in stress and coping and the psychophysiology of PTSD and is used to generate worksite intervention strategies to reduce the risk for PTSD.

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0. Introduction

Mass fatality incidents (MFIs) expose medical examiners/coroners, recovery workers, and associated staff to circumstances that may increase their risk for developing both acute stress disorder (ASD) and post-traumatic stress disorder (PTSD). Recent reviews of crisis management efforts with emergency employees have highlighted the need for pre-event interventions to decrease the risk for employees likely to be involved in the response to mass fatality or other crisis events.^{1,2} The aim of this paper is to provide guidance for developing workplace policies and programs that can decrease the risk for the development of ASD and PTSD in forensic and recovery workers. We use models derived from stress and coping theories to explain the process leading from event exposure to symptom development.^{3–5} An understanding of this process can be used to develop strategies designed for implementation in the

workplace prior to a mass fatality incident and targeted at both the agency as a whole as well as the individual employee.

1. Definitions, diagnostic criteria, and prevalence

The diagnostic criteria for acute stress disorder (ASD) and post-traumatic stress disorder (PTSD) require that “an individual must have experienced, witnessed, or been confronted with an event that involved actual or threatened death or serious injury, or threat to the physical self or others”.⁶ The criteria further specify that the individual must have responded to the event with fear, helplessness, or horror. In ASD, the individual must experience at least three symptoms of dissociation which can include emotional numbing, feeling dazed, dissociative amnesia, derealization (i.e., feeling as if things are not real), or depersonalization (i.e., feeling as if you are outside of your body or as if things are occurring in a dreamlike state). For both ASD and PTSD, individuals must also display symptoms of re-experiencing, avoidance, and hyper-arousal although the exact number of symptoms may vary by diagnosis.⁶ Symp-

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toms exhibited 2 days to 4 weeks after the event merit a diagnosis of ASD; whereas symptoms persisting a month after the event or emerging more than 4 weeks after the event are considered indicative of PTSD.⁶ A detailed review and evaluation of the diagnostic criteria and epidemiology of ASD can be found in Bryant and Harvey⁷ and further information about PTSD can be found in Breslau et al.⁸ or Foa et al.⁴

Following acute threatening events, studies suggest that ≈14–33% of individuals will develop some symptoms of ASD with the incidence depending on the type of event and predisposing factors.^{6,9} Recent evidence suggests that ≈75–80% of individuals who receive a diagnosis of ASD subsequently develop PTSD.⁵ Those who experience dissociation at the time of the incident are more likely to subsequently develop PTSD.^{10–19} However, following an event, a substantial proportion of individuals will develop PTSD, even in the absence of ASD symptoms.²⁰

2. Mass fatality incidents and risk for PTSD

Mass fatality incidents increase rates of full and partial PTSD in emergency workers. Marmar et al.²¹ found that the incidence of PTSD in NYPD officers prior to the World Trade Center (WTC) attacks was 3.5%, but at follow-up 18 months after the attacks, rates of PTSD had risen to 8% and rates of partial PTSD had risen from 3.5% to 15%. Rescue and recovery workers involved in the WTC incident were also significantly affected, with 13% of a sample of 1138 workers reporting symptoms of PTSD.²² Few studies have examined the incidence of ASD in this population, but Fullerton et al.²³ found that 25% of workers involved in the rescue and recovery of plane crash victims developed acute stress disorder.

Symptoms of ASD may also emerge in response to the acute stressors occurring in the immediate aftermath of the event. The stressors may include direct or indirect exposure to disturbing events and emotions. Symptoms of ASD may persist leading to a diagnosis of PTSD when the ability to recover from the acute stress exposure is hindered, either because the stress exposure is prolonged or when secondary stressors associated with the MFI make additional demands for coping.

The primary task for medical examiner personnel is the identification of victims and determination of the cause of death. The process of recovering and identifying large numbers of casualties itself may elicit symptoms, particularly if there is an unusual or disturbing cause and manner of death. For example, members of the Office of the Chief Medical Examiner of NYC were responsible for the storage and handling of more than 20000 fragmented human remains.

Vicarious or secondary traumatization may be a risk for forensic workers who are indirectly exposed to traumatic events through handling the victims.²⁴ In a large or complex MFI, even individuals who do not normally work with victims may be assigned to assist in the documentation and

handling of the remains of the deceased. Individuals vicariously exposed to traumatic events may display symptoms, including intrusive imagery and thoughts, avoidance, emotional numbing, and hyper-arousal similar to those who were more directly exposed to the event. They may show related difficulties including substance abuse or somatization.²⁵ The single study examining the incidence of vicarious traumatization among ME personnel reported that ME body handlers responding to the Oklahoma City bombings had higher rates of alcohol-use disorders than did direct trauma victims.²⁶ Although ME personnel may have developed strategies for managing their affective responses (e.g., using distancing or taking breaks) during routine exposure to fatalities, an MFI may overwhelm available coping resources.

An MFI may also force individuals to assume responsibilities outside their normal work duties, and consequently increase their risk for vicarious traumatization. For example, most personnel in ME or coroners' offices generally do not have in-depth contact with grieving or traumatized families. This work is generally left to specialists, often with mental health training. However, in an MFI more members of the staff may be assigned to help with the collection of ante-mortem data from families or in the provision of emotional or material support as this information is collected and identifications are made. These interactions may expose forensic personnel to significantly distressed individuals. If the workers have experienced significant trauma in their own past (e.g., other disasters, violence or abuse), hearing about the victims' experiences can also trigger recollections of the workers' own past trauma exposure.²⁷

A difficult identification process can prolong stress exposure. For example, it took more than four years for members of the OCME to identify the 2749 victims from the 9/11 attacks, through the examination of more than 20000 physical remains.²⁸ Opportunities for recovery may also be limited if forensic and recovery workers are exposed to multiple disaster experiences.²³ In the case of the NYC OCME, employees faced back-to-back disasters, managing the identification of victims from the World Trade Center incident beginning in September 2001 and then the 265 victims of the crash of flight 587 in November 2001. During this time, the office also conducted or participated in a series of demanding emergency exercises and technical drills that were organized in part, as a consequence of the 9/11 attacks. These exercises were crucial, but also served to sustain high-level demands and exposure to reminders of terror for the employees.

Secondary stressors associated with the MFI can also hinder recovery.^{29,30} The ME office responsibilities can be drastically increased in the aftermath of an MFI. Technical staff may find a substantial increase in demand for procedures and tests. Administrative staff may find themselves required to obtain funding, personnel, space, and equipment to insure that the new services can be performed. Personnel will often be highly committed in an effort to respond to the needs of the victims' families, pushing the

pace and intensity of the work. The increase in the workload for all members of the organization can serve as a secondary stressor, requiring additional coping resources and limiting opportunities to recover.

Even relatively minor events in the workplace can trigger or maintain the PTSD symptoms of re-experiencing, avoidance and hyper-arousal, and the symptoms can interfere with workplace functioning. For example, re-experiencing symptoms (i.e., intrusive sensations, thoughts or emotions associated with the event) may be triggered by objects and events in the workplace. One ME employee reported that handwritten messages of support on boxes of supplies sent in by outside vendors triggered intrusive memories of the WTC event.

Symptoms of avoidance and hyper-arousal can be difficult to recognize. Avoidance symptoms include a restricted range of affect, looking flat or withdrawn, even when participating in activities that previously evoked emotional expression (e.g., meetings, parties, etc.). These symptoms can be misinterpreted by others as stoicism or calm in the face of adversity. Hyper-arousal symptoms include irritability. Irritability is often interpreted as a short-term consequence of increased stress or a sign of a difficult personality. However, if the irritability and related symptoms of excessive arousal persist, they may indicate the onset of PTSD or depression. Unchecked, behavioral symptoms of both avoidance and irritability can have significant effects on workplace social interactions and undermine effective problem solving and morale.

3. Mechanisms

One way to generate strategies for the primary prevention and management of ASD and PTSD is to identify the mechanisms linking stressor exposure to ASD and PTSD.³¹ The mechanisms described here are based on basic research on the psychobiology of PTSD,^{4,32–35} as well as general stress and coping models used in behavioral medicine research.³ Generally, theorists suggest that ASD symptoms and/or PTSD symptoms are likely to develop when the event and the individual's own physical and mental responses to the event are outside his or her pre-existing understanding. Consequently, the individual is unable to integrate the recollections of the images, sensations, and emotions experienced during the event into his or her existing conception of the world. Therefore, the recollections of the event are dissociated from normal conscious experience. Unsuccessful efforts to develop an understanding of the experience or to hold the experience at bay (i.e., to avoid having the horror re-experienced) can create a state of sustained physiological arousal and exhaust coping resources.

Limitations in the ability to process traumatic events can be a function of the nature of the event itself (i.e., high-intensity events can be more likely to overwhelm coping resources), as well as individual-level and agency-level risk factors. Individual-level risk factors include variables

such as depression or prior trauma that may influence perception, emotion, and coping; and consequently create vulnerability to stress over-load. Agency-level risk factors include secondary stressors that add to the burden (e.g., additional workload arising from the MFI) as well as institutional policies and practices that limit effective coping. The pathway leading from event exposure to symptom development is described below.

3.1. Step 1: From an objective event to appraisals of stress

The pathway from event exposure to ASD or PTSD begins with an objective event. An objective event is subjectively appraised as stressful if the event presents demands that are perceived as exceeding the individual's capacity to cope.³⁶ In general, events which are unpredictable, uncontrollable, or threatening are more likely to be perceived as stressful and to increase risk for ASD and PTSD.^{4,37,38} Changing the perceptions of predictability, controllability and threat of a particular type of event may permit employees to change their expectations about the nature of the event itself and their own risk. Consequently they may be better able to understand the event and their own reactions as they occur, and subsequently limit the degree of distress and dissociation when events occur.^{1,18}

3.1.1. Predictability

We perceive an event as predictable when we have detailed knowledge of the timing of the event and its course, as well as an understanding of our personal response to the event. It is not sufficient to know that the “bad” event or stressor will happen eventually. We need to know the specific details about the timing and nature of the stressor and about our own reactions. This information allows us to make judgments about the coping resources we need and about the opportunities for recovery.

Our previous research with New York City Traffic Enforcement Agents (TEAs) illustrates these issues.^{39–42} New York City TEAs patrol the city streets and issue summonses for vehicular and parking violations. They are frequently confronted by motorists and pedestrians who are angry about receiving these summonses. Experienced TEAs report an average of three negative interactions with the public per day, some of which have the potential for becoming physically aggressive.^{39,41}

Some of the New York City traffic agents reported that they could not “get used to” stressful encounters with the public.³⁹ Despite the fact that they could anticipate that a motorist was likely to harass them at some point during the day, they could not predict exactly when, where, and how this attack would occur (i.e., a screaming motorist at 10:23 am, an arm-waving insulting motorist at 1:27 pm). Without knowing the nature, timing and duration of the event, they felt they needed to be continuously prepared for the worst-case scenario. This expectation can create

an attitude of tense hyper-vigilance that can be physically and psychologically exhausting to maintain and eliminates the opportunity for rest and recovery between stressful events.⁴³

Rescuing survivors can be a very difficult and dangerous task, but it is time-limited. After a finite interval, the possibility of the victims' survival is likely to be eliminated. For medical examiners and other forensic workers, the challenges begin with the first deaths, but the duration of the victim identification task is unpredictable. Following the attacks on the World Trade Center (WTC), the fragmented condition of the victims' remains presented technical challenges for the identification process and psychological challenges for those involved in managing the task. These challenges meant that the timetable for completing the identification of the victims was continually revised, with the identification process ultimately lasting over four years. Depending on the circumstances, a mass fatality incident can present intense demands above and beyond the normal operating caseload and can require individuals to galvanize psychological resources for prolonged and unpredictable periods.²⁸

3.1.2. Controllability

The controllability of an event also influences the degree to which an event is perceived as stressful. An event is appraised as controllable when the individual perceives him or herself to have control over the frequency and intensity of exposure to the dangers associated with the stressor and control over his or her emotional and physical responses to the event. The intensity and duration of post-event symptoms may also be influenced by the individual's control over the process of recovery (i.e., access to treatment, a paced or regulated return to work, etc.) and the degree to which he or she is exposed to secondary stressors (i.e., additional life stressors, including work overload).^{29,30,44–46}

In our previous study, the traffic agents acknowledged that they had no control over the motorists' behavior. Consequently, they were concerned about physical damage they might sustain if the motorist escalated the confrontation. They were also concerned about maintaining control over their own reactions when confronted by a threatening or dangerous motorist. Some TEAs were fearful that during the confrontation, they might suppress their feelings and walk away humiliated or depressed. Others worried that they might retaliate in the face of motorist aggression, and potentially lose their jobs.^{39,47} To experience the situation as controllable on each level, the TEAs needed (1) to have strategies for managing the motorist as well as access to back-up support in case the situation escalated, (2) they needed to have confidence in their ability to tolerate their own emotional experience and control their behavior; and (3) they needed to have some control over the process of "cooling off" after a difficult confrontation, (i.e., they needed others in the workplace to listen and understand their distress, and to provide them with an opportunity to calm down before returning to work).

To perform their regular duties recovering victims, identifying victims or performing autopsies, forensic workers may have learned to distance themselves from their own negative emotions in certain circumstances. In cases in which their existing strategies for emotional management are not possible, (i.e., when a mass fatality incident pushes the pace of exposure past an individual's threshold for coping), forensic workers may feel uncertain about how to manage their distress. They may have very limited experience communicating about these emotions with others and be unable to recognize or be ashamed of their feelings. This may make it more likely that the emotional consequences of disasters will be perceived as uncontrollable.

Other personnel in a medical examiner's office may also encounter uncontrollable emotional experiences when they take on extra responsibilities, including providing support to the families of victims. Mental health providers have training to recognize their own emotions and responses to the emotional demands of interacting with highly stressed individuals. This training provides them with a strategy for recognizing and labeling their own thoughts and emotions as well as those of the victim. These strategies foster a sense of control over their feelings during the interactions and facilitate recovery following the interactions. In contrast, forensic workers may not have the information necessary to help them interpret their own reactions to the needs of the families of the victims. Some may feel overwhelmed by sadness, helplessness, anxiety, and anger as they interact with family members facing loss. These experiences of uncontrolled emotionality may increase risk for secondary or vicarious traumatization.

3.1.3. Threat

A third factor influencing perceived stress is the degree to which the event is experienced as threatening. An event is perceived as threatening when it is likely to result in physical or emotional harm (e.g., pain, disfigurement or death, exhaustion, substantial loss of property, relocation, humiliation, or loss of self respect). In some cases, people can anticipate the costs associated with emotional losses as more severe than the costs associated with physical losses, particularly if they anticipate feeling disgust or humiliation.⁴⁸ Forensic workers who expect to be "calm, cool and collected" when disaster strikes may feel particularly threatened if the MFI proves to be so devastating that they become overwhelmed by the practical and emotional demands, even temporarily.

Individuals are more likely to perceive events as threatening if they do not believe they have resources or will be provided with the resources to deal with these events. Forensic and recovery workers may expect governmental agencies to provide resources to handle the material aspects of a disaster (i.e., equipment, funds, or personnel). They may have confidence in their ability to articulate their needs for these material resources, to evaluate the effectiveness of these resources, and to structure their requests for additional services. Forensic workers may expect govern-

mental agencies to provide mental health resources to address the emotional sequelae of disaster work. However, they may not have confidence in their ability to understand their own mental health needs or to evaluate the legitimacy, utility, and quality of help when it arrives. Consequently, they may be reluctant to make use of services or request help when needed. They may fear that psychological services will end up “making the dam burst” or take advantage of their vulnerability. In fact, recent research reports indicate that in response to the WTC attacks only 3% of rescue and recovery workers reported accessing mental health services.²²

An MFI may become more threatening because it may generate a series of secondary stressors that can undermine the agency’s functioning. For example, to respond to an MFI, an agency may require additional equipment, personnel, funds, and space. In some cases, emergency funds may be made available, but identifying and deploying these resources may present a sustained and unmanageable workload. For example, during an MFI processing the identification of victims would be facilitated by additional skilled personnel, ranging from dental assistants to pathologists. However, it may require a very high-level of effort to identify, hire, train, and house additional personnel quickly enough to be useful for existing overburdened staff members. An MFI may require personnel to perform high-level and high-intensity technical and administrative activities that are above and beyond the employees’ regular duties, creating a workload that cannot be sustained without significant strain.

3.2. Step 2: From stress exposure to distress

Once an event has been appraised as stressful (i.e., uncontrollable, unpredictable and/or threatening) the individual will experience distress. The distress response can include: (1) panic, helplessness and/or horror or other emotions including disgust, self-loathing, etc., (2) physiological arousal, and (3) loss of control over mental processes.⁴⁹ These emotional and physical responses form a portion of the traumatic exposure. Consequently, people develop stress reactions not only to an event, but to their emotional and physiological response to the event.

Similarly, ASD and PTSD develop when the emotions and physical sensations evoked by an event are intolerable. Some research suggests that the magnitude of the immediate distress response predicts the likelihood of subsequently developing PTSD symptoms.⁵⁰ The magnitude of distress is affected by characteristics of the individual, event, and the environment.

Individual level risk factors include a history of physical or psychiatric illness or history of trauma. For example, depression (either current depression or a history of depression) intensifies the magnitude of emotions experienced during the traumatic event.⁵¹ Additional risk factors include an unsupportive home environment,^{52,53} low-income, and minimal education.^{54,55} An individual’s cogni-

tive coping style may also increase the risk for the development of ASD or PTSD. For example, a wishful thinking coping style has been associated with symptoms of PTSD in accident victims.⁵⁷ For a full discussion of risk factors see Ozer et al.⁵⁶

Within a forensic or medical examiners’ office, there may be variations among individuals or work units in the prevalence of these risk factors for PTSD. However, individuals at any level in an organization may suffer from some mental illness, have a predisposition to mental illness, or have prior exposure to personal or job-related trauma. Consequently, the same event can evoke substantially different responses depending on the individual’s exposure to other risk factors.

3.3. Step 3. Distress, memory, and physiological response

Distress affects both the ways we remember events and the physiological reactions we have during and after these events.⁵⁸ The symptoms of ASD and PTSD arise in part from difficulties with the way memories of the event are stored.^{59,60} Dissociative symptoms may emerge when sensory or affective information cannot be integrated into the individual’s existing knowledge structures and is therefore stored using different processes than used for less distressing information.^{19,61,62} In re-experiencing, memories of the event intrude in an unwanted and distressing way. In avoidance, the individual is unable to recall aspects of the event or makes every effort to avoid recalling the event and its associated emotions.

When we are intentionally trying to form memories (e.g., learning in a class) we use different areas of the brain (e.g., frontal lobes) and a different encoding process occurs. We use these “higher level” brain structures to put the information into words and into a meaningful context. In contrast, when we face immediate danger our brains are structured to make it faster and easier to process certain types of emotional or sensory information associated with the threat.⁶³ The initial information about the threatening event is transmitted directly to an area of the brain that responds to threat and triggers the actions necessary for us to “fight or flee”.⁶⁴ The activation of this process releases hormones that may contribute to a stronger encoding of the emotional information within the memory.⁶⁵

Unpredictable, uncontrollable and highly threatening events heighten our senses and are more likely to be stored as sensory-perceptual memories (i.e., as an image rather than as verbally encoded information).⁶³ We form a kind of mental photograph of the situation, and the memories of these situations are often referred to as “flashbulb” memories.⁶⁶ Research studies have indicated that flashbulb memories are particularly robust even in the weeks and months following the initial event.^{67,68}

Qualitative research suggests that it is these unprocessed memories, (i.e., those that are stored as images and feelings but not necessarily as ideas or words), that are most likely to return as intrusive images or flashbacks.⁴⁸ For example,

“hot spot” events, such as the moment when the bomb went off or the recovery worker first sees the body, are events that may be stored in a sensory/emotional form, ready for fast recollection but potentially divorced from verbal processing.⁴⁸ The goal of all treatments for ASD and PTSD is to help patients verbally process their memories of the event and integrate them into a new understanding of the world. However, because of the way these events are stored in the brain, it can be hard to change the nature of encoding.

Emotional experiences of distress are accompanied by changes in physiological functioning that have acute and chronic effects. Specifically, as an individual appraises an event as threatening or harmful, a cascade of neurophysiological processes is initiated. As the event is perceived, the sympathetic nervous system (SNS) is activated, releasing adrenaline and initiating the classic “fight or flight” response.⁶⁹ The activation of the SNS includes such physiological responses as increases in respiration, heart rate, and blood pressure as well as pupil constriction, and increased blood flow to the muscles.^{70–72} At the same time, there may be a decrease in the activation of the parasympathetic nervous system, which is responsible for putting a “brake” on the level of SNS activation (slowing heart rate, reducing blood pressure).^{73,75} Over the long-term, without good recovery, the short term increases in SNS activation can become sustained, heightening startle response, and disrupting sleep.

Amygdala nuclei in the brain start the process that triggers the release of cortisol, a stress hormone.⁷⁴ When cortisol is released for sustained periods, cells in the hippocampus (a section of the brain responsible for memory and other processes) are destroyed.⁷⁶ This is particularly problematic, because the hippocampus is involved in regulating stress response. That is, the stress hormones that are released when an individual appraises an event as stressful also destroy parts of the brain that are important to turning off the stress response.⁷⁷

Other brain areas, including the prefrontal cortex, are involved in stress inhibition, but may also be affected by stress exposure. Consequently stress exposure may produce damage to areas that are important for regulating physiological stress response. In addition, stress-related damage to these areas may affect information processing in general and the use of cognitive-coping strategies in particular.⁷⁸

One way to consider these issues is to think of PTSD as a function of a positive feedback loop. Event exposure elicits physiological activation. Cognitive changes that are a function of sustained physiological activation render individuals less able to process the emotional information that may help them reduce sustained arousal. Individual differences, including a history of depression, early neglect and abuse, substance abuse and certain medical conditions may also affect sustained physiological activation. Environmental factors can maintain these high levels of arousal. These environmental factors include persistently demanding conditions (e.g., sustained difficult workload, lack of

sleep or good nutrition, sustained attacks or danger, watching media coverage, being close to the attack area), low-levels of social support and low-levels of socioeconomic status.

4. Prevention and intervention

The underlying principle of preventive interventions is to make the experience of being exposed to the mass fatality event and one’s own reactions to the experience more predictable and controllable and less threatening. These interventions can change expectations about the event, making it more likely that sensations, perceptions, emotions and thoughts will be recognized and integrated into existing ways of thinking about events and emotions. Consequently, coping resources can be more quickly identified and psychological and physiological recovery can be facilitated.

Primary prevention programs work to reduce risk for PTSD by strengthening both employees and the agency before a catastrophic event occurs. Although there are a number of important programs that may facilitate PTSD reduction, as reviewed in Sheehan et al.¹, there is very little empirical research on pre-event primary prevention efforts for PTSD in response to MFI. We will use the model we have described to provide an initial framework for considering possible strategies for preventing PTSD in forensic workers. Some of the interventions reduce the intensity of the stressor by addressing perceptions of unpredictability, uncontrollability and threat. Other interventions offset the impact of the event by strengthening stress management or coping strategies. Intervention strategies are listed in Table 1.

4.1. Predictability

It may not be possible to improve the predictability of an event, but it is possible to improve the predictability of the agency’s and the individual’s response to the event. We can make situations more predictable by providing some context to help organize the thoughts and feelings individuals may have during and following high-intensity stressful events.

Educational information about the effects of particular types of events (i.e., bombing, anthrax attacks, etc.) and of the health consequences of event exposure may help provide a context for forensic workers to use when processing an MFI. In addition, it can be important to understand the ways in which factors associated with the event (e.g., number of fatalities, condition of the remains, rate of recovery, and availability of a manifest) influence the duration of the identification process.²⁸ Factors which lengthen the identification process will influence the duration of stress exposure for the employees.

Technical drills that simulate critical incidents allow rescue and recovery workers to plan and practice effective responses to mass disasters (i.e., bomb or bioterror

Table 1
Strategies for preventing ASD and PTSD at the individual and agency level

		Potential interventions to reduce risk for ASD and PTSD: Strategies to improve predictability and controllability and decrease threat
Predictability	...of the circumstances of the event	<ul style="list-style-type: none"> – Information sessions about health risks associated with different types of mass disaster events (i.e., biological, chemical, etc.) – Information sessions about the ways factors associated with the event (i.e., number of fatalities, difficulty of identification, etc.) affect duration of event and psychological and material resources needed – Technical drills to practice emergency responses to particular threats (i.e., bombings, etc.)
	...of the individual employee's reactions	<ul style="list-style-type: none"> – Information sessions on the nature of stress responses, on acute stress disorder and PTSD symptoms – Informational sessions on risk factors for PTSD – Mental health screening programs to allow employees to voluntarily identify mental health conditions that may serve as risk factors for the development of PTSD
	...of the agency's response	<ul style="list-style-type: none"> – Identification of resources (i.e., money, equipment, technical expertise, etc.) required for different kinds of threats and responses – Determination and dissemination of the policies for handling emergency situations (e.g. chain of command, access to overtime, sources of emergency funding, procurement policies, disability policies, access to onsite mental health counselors, etc.) – Communication with other similar agencies with experience with MFI to understand the effects of MFIs on the management team, resource needs, etc.
Controllability	...of the individual's immediate emotional response to the event	<ul style="list-style-type: none"> – Referrals to or on-site opportunities for development of relaxation skills (i.e., Yoga, meditation classes, etc.) – Identify post-event crisis intervention programs for use following an incident
	...of the individual's process of rest and recovery	<ul style="list-style-type: none"> – Broad dissemination of referral resources for mental health services – Clarification of insurance reimbursement for mental health services, improvements in coverage parity as needed. – Articulation of policies and procedures for responding to stress "overload" – Health screening for long-term stress-related disorders (e.g., high-blood pressure, etc) – Clarification of the mission of the agency
	...of secondary stressors facing the agency and individual	<ul style="list-style-type: none"> – Identification of skills needed for volunteer activities (i.e., contact with victim families, handling of antemortem data, etc.) and training for these skills – Identification of additional technical and administrative workload from a variety of types of MFIs, including consideration of length of tours/shifts and manpower requirements and procurement of resources.
Threat	...to the individual employee's physical integrity and mental health	<ul style="list-style-type: none"> – Clarifying performance expectations during MFI – Providing high-levels of performance feedback and recognition for service – Normalizing experiences of distress, creating agency-wide policies that include prevention of mental health risks as part of the overall employee safety procedures
	...to the agency's reputation and integrity of function	<ul style="list-style-type: none"> – Keeping a log or historical account of policies and decision-making during the disaster response – Media management to control public expectation and promote recognition of employee efforts and demands – Include recognition of mental health concerns and prevention of mental health threats in employee safety training, along with other physical health safety – Conduct anonymous employee feedback surveys to obtain information on employee health and perceptions of agency's response

threats).¹ This preparation may reduce the degree to which these events and their physical sequelae are perceived as threatening or unpredictable. Employees learn to identify the equipment necessary to perform complete recovery and identification tasks; they practice taking safety precautions and using safety equipment; they establish procedures for coordinating communication within departments or among agencies; they identify weak spots in preparedness; and they identify needed skill sets and necessary resources.

These exercises can also provide an opportunity for individuals to learn about stress and stress responses, to learn

to anticipate their own concerns about their emotional responses, and to identify professional healthcare resources that are available for assistance. With trained facilitators, individuals can engage in guided exercises to describe and label their emotional reactions and thoughts during the drill, to anticipate their concerns about other future stressors, and to articulate their perceptions about their ability to manage their short-term and long-term emotional responses to these situations.

Psychoeducational approaches can also provide guidance for forensic workers who are likely to engage with

the victims' families in the collection of ante-mortem data or other tasks. Standard counseling training can provide some initial guidance. Providing opportunities to interact with family members who have experienced disasters can help forensic workers to identify and cope with their own reactions to the victims' families' needs. This information may provide the forensic worker with a framework for recognizing and effectively responding to both the family members' needs and his or her own emotional responses. Some guidance for the type of core competencies that may be helpful in responding to families in need is provided by Parker et al.²

Disseminating information about risk factors for PTSD can be useful. Individuals can vary in their risk for developing PTSD, based on history of illness, exposure to trauma, education level and other factors.⁵⁶ However, targeting individuals based on these risk factors may violate standards of confidentiality in the workplace. It may be more appropriate to educate employees about factors that increase risk and encourage proactive help-seeking.⁷⁹ Confidential and free mental health screening programs can provide individuals with the information they may need to reduce their own risk. Proactive identification and treatment of pre-existing psychiatric conditions may be especially important given their prevalence in the population (e.g., rates of lifetime depression exceed 9% of the US population).⁸⁰ In addition, once a mass fatality incident has occurred, there is a strong disincentive for employees to recognize illness and be forced to withdraw from responsibilities during a crisis when they may be needed.

Many agencies with forensic or emergency responsibilities have developed policies and procedures for handling crisis-related mental health needs.¹ Inter-agency communication can help identify strengths and weaknesses of each of these programs. Some of the policies and procedures may be agency-specific, but there may be generalizable principles usable across services. This collaborative communication can be used to facilitate resource planning.

4.2. Controllability

An agency may not be able to control the magnitude or type of disaster or the type of response that will be needed. However, the agency can improve the controllability of the individual's mental and physical responses to the event. It is important to recognize those aspects of the situation (i.e., the MFI itself as well as the stress responses of employees) that are actually amenable to control. Inaccurate beliefs in the controllability of a particular of event or of one's emotional responses to the event can be detrimental.^{44–46}

Individuals may be able to control their immediate physiological arousal in response to the event with competence in relaxation skills (i.e., yoga, meditation). Reduced arousal may prevent long-term physiological and psychological harm related to event exposure. On-going worksite classes can make these resources more readily available.

Identifying a post-event crisis intervention program and appropriate providers for rapid implementation will improve the controllability of the post-disaster response. Both critical incident stress debriefing (CISD) and psychological first aid (PFA) have been advocated for the treatment of individuals following a critical event.^{2,81–85} The utility of these different programs may vary depending on the type of event and the nature of the employees' work.⁸⁶ Reviewing the types of interventions offered in each approach and determining the best fit for the agency is an important preparatory task.

Both programs involve the identification and referral of individuals needing sustained expert assistance. Proactively identifying mental health experts and developing strategies for confidential referral are important tasks. Agencies can facilitate the process of recovery by making referral resources easily available and clarifying mental health insurance reimbursement. This may be especially important since recent research suggests that the controllability of the recovery process is a key aspect of treatment for victims with PTSD.^{44–46}

Over the long run, PTSD appears to be associated with an increased risk for cardiovascular disease^{87–89} gastrointestinal, dermatologic and musculoskeletal diseases,^{87,89} and for autoimmune diseases including rheumatoid arthritis, psoriasis, and hypothyroidism.^{90–92} There is also evidence indicating that PTSD is significantly associated with suicide ideation and suicide attempts.^{93–96} Health screenings for stress-related disorders may be a useful adjunct and reduce long-term health costs.

Clarifying the mission of the agency and its specific responsibilities during an MFI is critical. All personnel will be confronted with individuals facing serious needs as a result of the MFI (i.e., potentially loss of homes, loved ones, fears of illness, etc.). These intense and varied demands can be confusing and overwhelming to employees. It is important to clarify exactly what the mission of the agency is and what is expected of the individual employees. It may also be useful to remind employees that the burden of responding to the many demands created by the MFI is shared among agencies and that a broad range of resources may be available for individuals in need.

As agencies prepare disaster plans or participate in emergency drills, they can identify potential secondary stressors. These stressors can include the intense time pressure imposed by a public needing rapid identification of victims or the increased administrative workload as new personnel and equipment are acquired to facilitate identification. An emergency-related increase in workload will require an increase in resources and mastery of the emergency procurement rules and procedures. It can be useful to preemptively identify funding resources and to have clear agency and jurisdiction policies about the procurement rules associated with each funding source. This can insure that resources are quickly available as needed and can help prevent mistakes and corruption.

4.3. Threat

It can be very helpful for management to articulate specific performance expectations and accepted coping strategies. In a crisis that tests professional competence, fear of failure can increase perceptions of threat (e.g. “If I can’t manage this caseload then my boss will think I’m incompetent.”). Subtracting shame, guilt and disappointment from the distress response can reduce the overall stress burden.

It is useful to normalize the experiences of distress related to the MFI. Employees may have concerns that reporting symptoms or seeking help will lead to stigmatization (either as crazy or lazy). They may fear that being stigmatized will limit their opportunities for professional growth following recovery. Managers may be concerned that they will be taken advantage of or that they will make mentally ill employees more unstable. Prior clarification of disability policies and procedures can reduce manager’s concerns.⁸⁰

If employees perceive managers and supervisors as historically unresponsive to their health and safety concerns, (including emotional health concerns), they may be more likely to view new events as threatening. They may not believe their concerns will be recognized and their distress ameliorated, and consequently may be more likely to simply become overwhelmed by events. It may be helpful to obtain some data from employee surveys to understand how employees view the agency’s attitudes towards physical and mental health concerns.

Providing positive feedback for work well done, expressing appreciation for effort, and acknowledging the strain mass disasters place on all employees throughout the agency can be a critical part of reducing the burden for everyone. It can be important to recognize that there can be secondary stressors from an MFI, even for those not directly involved in managing the agency’s response to the MFI. Following an MFI, the regular responsibilities of the agency do not cease. Staff members who are not directly involved in the MFI-related tasks may have to assume the workload of those who are involved in the MFI. More management attention and more resources may be directed at those specifically involved in responding to the MFI. Staff members performing routine, but important, functions may now have less access to management and less support despite an increased workload. This can create tension among employees, undermining opportunities for recovery.

Every agency can be threatened by public criticism of its performance during an MFI. The public may question the agency’s response and make demands for performance that are unreasonable given available resources. The pressure generated by these demands can exacerbate the stress faced by management. Media relations staff can be helpful in generating short-term and long-term strategies to help educate the public and manage public criticism.

During every MFI, a variety of decisions will be made under highly pressured circumstances. These may include

decisions on the identification processes, on the need for resources, on the contracting procedures, etc. These decisions are often re-evaluated when the emergency is over. The post-event evaluation period needs to be handled with respect and care, since individuals made decisions under conditions very different from those present when the decisions are being evaluated. Forensic workers, like other emergency personnel, are willing to sacrifice a great deal to help others. If the meaning and nature of that sacrifice is attacked after the fact, individuals may have more difficulty tolerating the stress. One of the most important lessons learned from the experience of combat veterans from Vietnam was the role that appreciation and post-event treatment played in the development of PTSD. A high sense of purpose and respect for the mission can help individuals withstand the health consequences of stress exposure. Because traumatic stress can affect memory, it may be helpful to assign someone the role of historian, documenting decisions and the decision-making process as it occurs. These documents can be helpful in a later review of the emergency response.

Agencies have highly specified requirements to monitor and insure the physical health of their employees, and are required, for example, to recognize the risks associated with exposure to toxins in laboratories or pathogens associated with decomposing bodies. Establishing procedures for the early detection of psychological symptoms can be an important adjunct to existing efforts to monitor employee health.

5. Conclusions

ASD and PTSD are common responses to critical incidents including MFIs. Symptoms develop when individuals perceive events and their own responses as unpredictable, uncontrollable and threatening. Steps can be taken on both an organizational and an individual level to improve the degree to which the risks associated with these events are appropriately anticipated and managed. We routinely provide safety equipment to protect physical functioning. We can and should provide safety procedures to protect emotional and intellectual functioning as well.

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